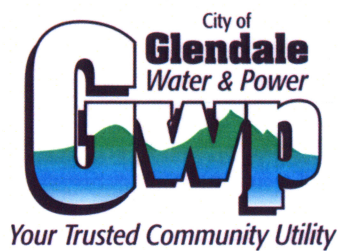


# **ELECTRIC SYSTEM INSPECTION REPORT**

## **2013**



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## Summary

Glendale Water & Power (“GWP”) proudly delivers high quality electric service to 85,358 residential and commercial customers within the City of Glendale. GWP is a Reliable Public Power Provider (“RP3”). GWP has earned the RP3 Diamond designation from the American Public Power Association (“APPA”). We are one of 35 public power utilities out of 184 designated utilities to earn this elite designation. In the past two years, an RP3 designation was awarded to only 184 public power utilities out of 2,000 nationwide utilities that provide customers with the highest degree of reliable and safe electric service.

GWP designs, constructs, operates, and maintains it’s electrical distribution system in accordance to accepted good engineering practices and equipment specifications. In order to continue to provide high-quality, safe and reliable electric service to our customers, GWP has developed various inspection and maintenance programs to identify and address potential issues within the electrical distribution, sub-transmission, and substation systems. GWP follows industry standards and practices, including California Public Utilities Commission (“CPUC”) General Order (“GO”) 165 and 174, in developing these programs.

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## Inspection Programs

The following are GWP's inspection programs:

### 1. Electric Distribution and Transmission Facility Inspection

GWP has established programs for regular inspection and maintenance of the overhead and underground distribution and transmission equipment. These programs are designed to identify and assess aging equipment and prioritize their maintenance/replacement needs.

These inspection programs are as follows:

#### a. Visual Pole Patrol Inspection

This inspection is done annually to visually inspect the poles and overhead electrical equipment and determine whether a hazardous condition exists. The inspection reports are documented accordingly. Patrols are done under the supervision of an Electrical Line Mechanic ("ELM") or an ELM Supervisor I.

#### b. Detailed Pole Inspection

This detailed inspection is done, on a 5-year cycle, on the poles and overhead electrical equipment to determine whether a hazardous condition exists. This inspection consists of the following:

- Pole
- Pole number/ Pole Steps
- Cross arms
- Primary Distribution Conductor(s)
- Secondary Distribution Conductor(s)
- Low Voltage (building) Conductor(s)
- Transmission Conductor(s)
- Guy Wire(s)/Anchor(s)
- Fiber Tube(s)
- Ground & Molding
- Capacitors
- Cutouts (Protective Devices)
- Disconnects (Switching Devices)
- Line Tap Switches
- Pole Switches
- Re-closers
- Risers
- Street Lights
- Terminators
- Transformers

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The inspection reports are documented accordingly. This detailed inspection is performed by a crew consisting of an ELM with a minimum of 2-year experience, or an ELM Supervisor I, and an Electrical Helper.

**c. Pole Fumigation Inspection**

In addition to the detailed pole inspection, the fumigation inspection includes:

- Sound test
- Boring holes to measure shell thickness
- Injection of fumigants, if needed.

Information collected including pictures and measurements of communication cable levels are documented accordingly.

**d. Steel Tower Inspection**

Steel Tower Inspection involves one portion of a sub-transmission circuit going over the Verdugo Mountains. The circuit is patrolled annually by a helicopter courtesy of Glendale Police Department. The Inspectors look for any stress in the steel, evidence of flashover at the insulators, and any lightning arrestors that may have been damaged.

**e. Visual Vault Patrol Inspection**

This inspection is done annually to visually inspect vaults and underground electrical equipment to determine whether a hazardous condition exists. The inspection reports are documented accordingly. Patrols are done under the supervision of an ELM or ELM Supervisor I.

**f. Detailed Vault Inspection**

This is to inspect vaults and underground electrical equipment in detail on a 5-year cycle to determine whether a hazardous condition exists. This inspection consists of the following:

- Vault
- Vault number
- Vault Size
- Vault Location
- Vault Lid(s)
- Vault Vent
- Interior Conditions (Water/Air/Temp)
- Unistrut
- Primary Distribution Conductor(s)
- Secondary Distribution Conductor(s)
- Landings and Junctions
- Transmission Conductor(s)

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- Fiber Optics
  - Grounding of all equipment including size
  - Switches
  - Transformers
  - Vault Pump/Fan, if any

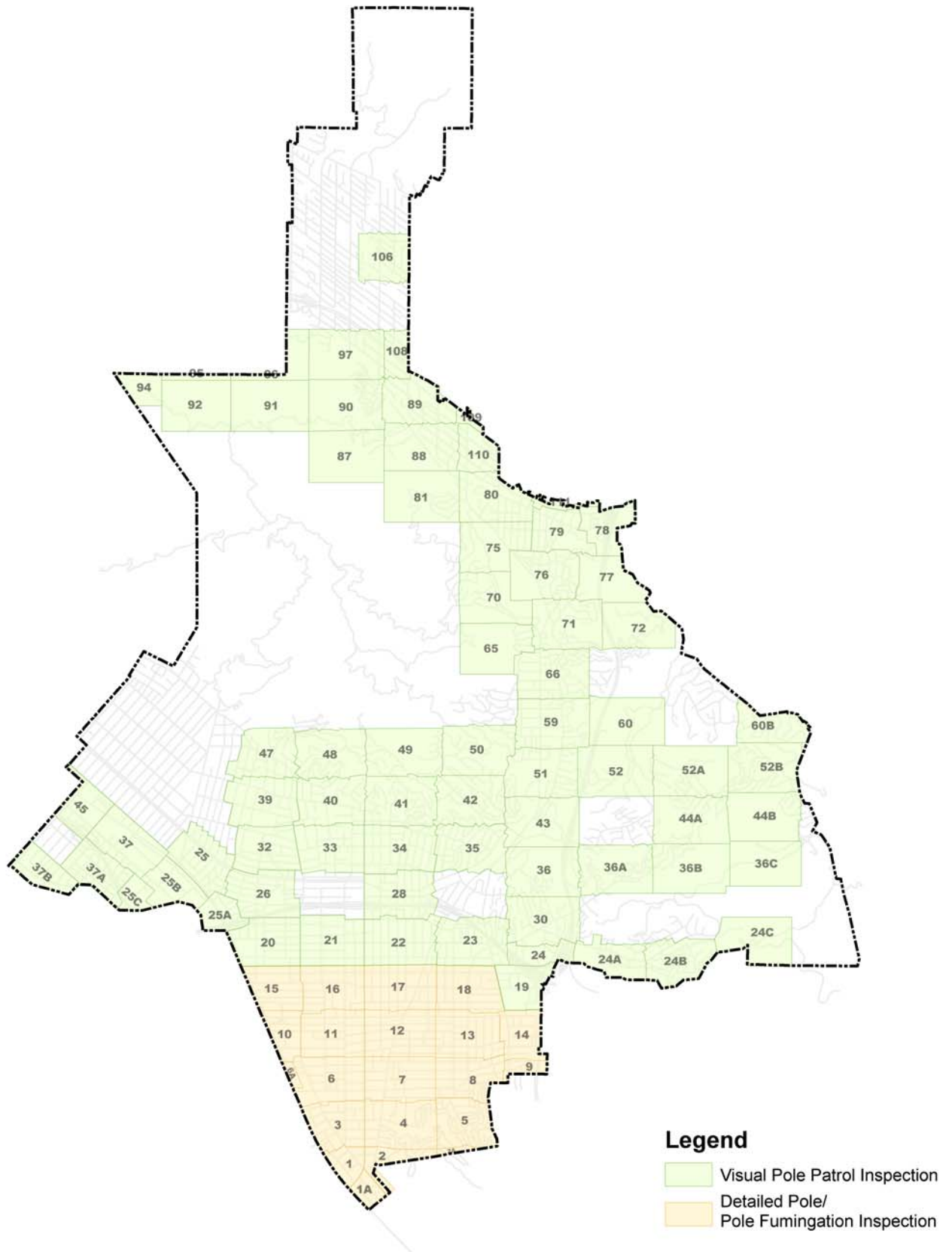
The inspection reports are documented accordingly. A crew consisting of an ELM with a minimum of 2-year experience, or an ELM Supervisor I, and an Electrical Helper performs this detailed inspection.

The above inspection programs cover all types of overhead and underground equipment including but not limited to poles, vaults, switches, transformers, cross arms, conductors, capacitor banks, reclosers, disconnects, risers, insulators and fuses.

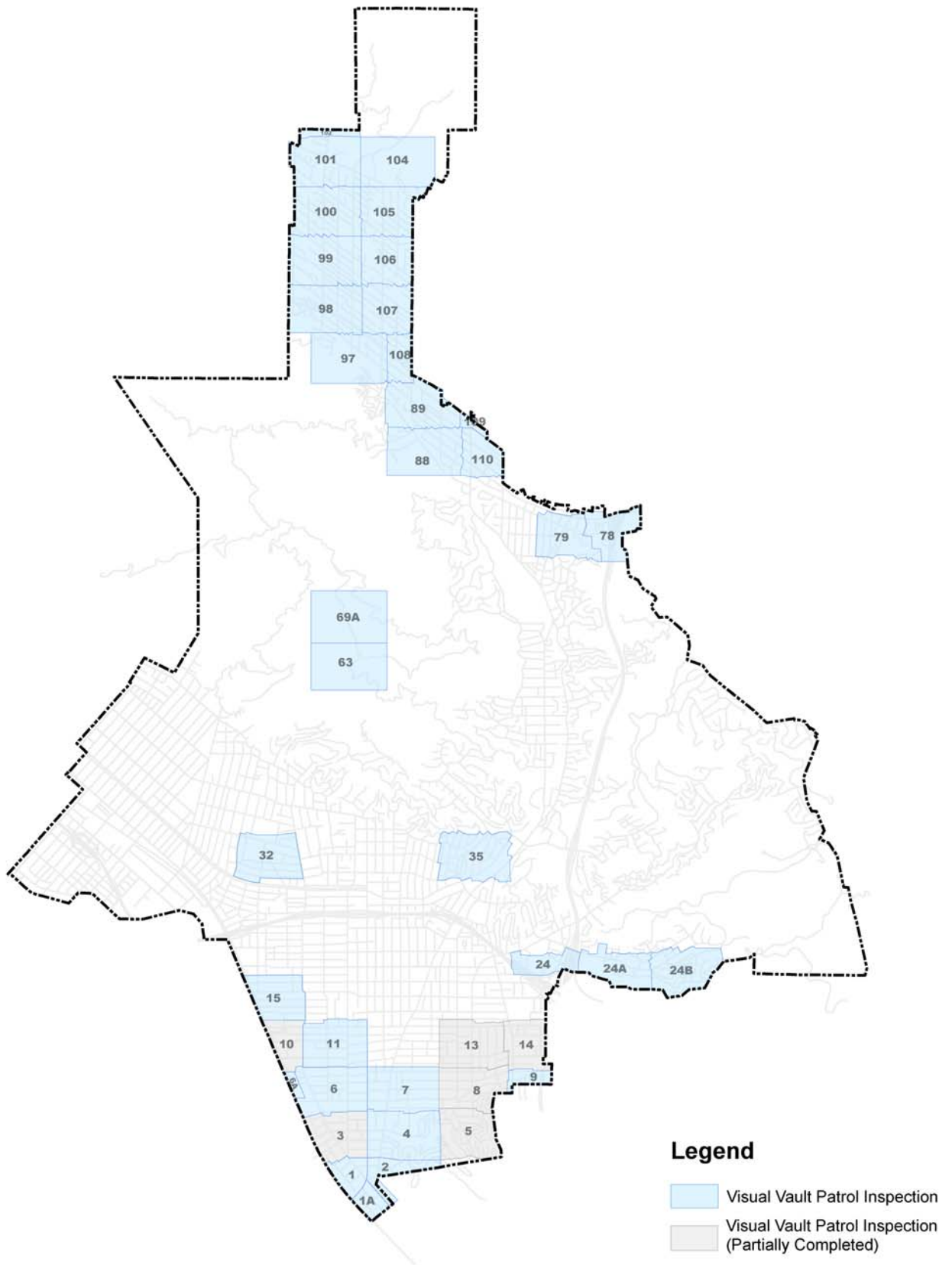
**g. Results**

Results of the above inspections are reported and documented as required by GO 165. The following illustrations show inspection results for the calendar year 2013.

# ELECTRIC DISTRIBUTION AND TRANSMISSION FACILITY INSPECTION 2013



# ELECTRIC DISTRIBUTION AND TRANSMISSION FACILITY INSPECTION 2013





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## **2. Electric Substation Inspection**

GWP established this inspection and maintenance program in 1999, and revised it in 2012 by adding the substation battery inspection. This program has three levels as follows:

### **a. Level 1 – Monthly Visual & Mechanical Inspection**

- Carry out general outward inspection
- Observe paint and look for flaking and premature rusting
- Check heaters
- Take readings from oil and winding temperature
- Check pressure system (i.e. nitrogen, hydraulic)
- Visually inspect pressure relief devices
- Bleeding of compressed air storage tank
- Verify proper equipment grounds
- Inspect all cables, insulators, bus bars, mountings, potential transformers and control wires for loose connections, sign of overheating, burns arcing or high voltage tracking
- Inspect substation foundations, walls, floors and ceilings for cracks, sign of water leading pooling
- Inspect and test cooling fans/blowers
- Inspect the substation batteries

### **b. Level 2 – Annual Preventative Maintenance and Testing**

- All Level 1 inspections
- Clean facilities (indoor and outdoor)
- Clean or replace dust filters
- Clean inside of cabinets, bus bars, cables, terminations, current and voltage transformers, insulators and associated mounting hardware
- Remove all weeds, brush and debris in and around substation
- Replace missing and burnt out indicators lights, racks, and station lights
- Thermal scan all electrical connections (i.e. bus, insulators, etc.)
- Perform necessary lubrication
- Check tightness of accessible bolted electrical connections
- Take oil samples and testing
- Operations tests
- Testing sump pumps and pump controls
- Wash insulators
- Operate circuit breakers

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**c. Level 3 – General Overhaul (Every 5 years)**

- All Level 1 & 2 steps
- Oil filtration and processing
- Perform adjustments
- Testing of electrical circuits
- Diagnostic tests (i.e. calibration, tripping & etc.)

This program is applicable to all types of substation equipment including but not limited to transformers, circuit breakers, relays, batteries, capacitors and fuses.

**d. Results**

Results of the above inspections are reported and documented as required by GO 174. The following illustration shows inspection results for the calendar year 2013.

# ELECTRIC SUBSTATION FACILITIES INSPECTION 2013

